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International Students, Immigration and Earnings Growth: The Effect of a Pre-immigration Canadian University Education

by Feng Hou and Yuqian Lu

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Abstract

While destination-country education provides many potential advantages for immigrants, empirical studies in Australia, Canada and the United States have produced mixed results on the labour outcomes of immigrants who are former international students. This study uses large national longitudinal datasets to examine cross-cohort trends and within-cohort changes in earnings among three groups of young university graduates: immigrants who are former international students in Canada (Canadian-educated immigrants), foreign-educated immigrants who had a university degree before immigrating to Canada and the Canadian-born population. The results show that Canadian-educated immigrants on average had much lower earnings than the Canadian-born population but higher earnings than foreign-educated immigrants both in the short term and in the long term. However, Canadian-educated immigrants are a highly heterogeneous group, and the key factor differentiating their post-immigration earnings from the earnings of the Canadian-born population and foreign-educated immigrants is whether they held a well-paid job in Canada before becoming permanent residents.

Keywords: international students, immigration, Canadian education, earnings

Executive summary

The number of international students pursuing education in countries with advanced economies has been rising rapidly over recent decades. International students are often regarded as an important group of young and well-educated individuals from which to select permanent residents. However, a few studies from Australia, Canada and the United States have shown that the earnings advantage of former international students over other economic immigrants is either small or non-existent. These empirical findings have been reflected in recent changes to immigrant selection policies in Australia and Canada.

This study compared the earnings trajectories of three groups of young university graduates: former international students in Canada who became permanent residents (Canadian-educated [CE] immigrants), foreign-educated (FE) immigrants who arrived at age 25 or over and had a university degree before immigration, and the Canadian-born population. It asked two questions. First, do university-educated CE immigrants earn as much as Canadian-born university graduates both in the initial years after immigration and in the long term, and, if there is a large earnings gap between the two groups, what are the possible determinants? Second, do CE immigrants have a large earnings advantage over FE immigrants in the short and long term?

Three data sources were used in this study. The sample of CE immigrants was drawn from the linkage of three files: the Temporary Residents File (TRF), the Immigrant Landing File (ILF) and the T1 personal tax file. International students were identified among temporary residents as anyone who ever held a study permit in Canada. The sample of FE immigrants was derived from the Longitudinal Immigration Database (IMDB). The sample of Canadian-born workers was created from the linkage between the 20% sample file of the 1991 Census and the Longitudinal Worker File, which is a 10% random sample of the tax-filing population, and the linkage between the 20% sample file of the 2006 Census and the T1 personal tax file. Common to all three data sources are the longitudinal earnings data from the tax file.

This study examined the earnings trajectories of university-educated individuals, by immigration status, in two cohorts: the 1991 cohort and the 2006 cohort. The 1991 cohort included the Canadian-born population aged 25 to 34 in 1991 (the census year), FE immigrants who arrived in Canada and were aged 25 to 34 in 1991, and CE immigrants who became landed immigrants from 1990 to 1992 and were aged 25 to 34 in the year of landing. Similarly, the 2006 cohort included the Canadian-born population aged 25 to 34 in 2006, FE immigrants who arrived in Canada and were aged 25 to 34 in 2006, and CE immigrants who became landed immigrants from 2005 to 2007 and were aged 25 to 34 in the year of landing.

CE immigrants who graduated from university had a large earnings gap with their Canadian-born counterparts both in the initial years after immigration and in the long term. In the first full year after becoming permanent residents, CE immigrant workers earned on average 50% less (for women) to 60% less (for men) than Canadian-born workers in the 1991 cohort. This gap narrowed in the first 10 years after immigration to 20% among women and 31% among men, but there was no further catching up afterwards. Narrowing of the initial earnings gap was also observed during the six-year follow-up period for the 2006 cohort. Part of the earnings gap was related to the fact that most CE immigrants belonged to a visible minority, and they tended to spend more time pursuing additional education. However, most of the gap could be accounted for by differences between CE immigrants and the Canadian-born population in their Canadian work history before the follow-up started. For both the 1991 cohort and the 2006 cohort, about 50% of CE immigrant men had medium or high earnings in Canada before the year of immigration, compared with about 90% of Canadian-born men. When group differences in prior Canadian work history were taken into account, the earnings gap of CE immigrants became much smaller in the 1991 cohort and disappeared in the 2006 cohort.

On average, CE immigrants had some moderate advantages in post-immigration earnings over FE immigrants. The earnings advantages of CE immigrants were concentrated among those who had medium or high earnings in Canada before immigration. CE immigrant men without a Canadian work history before immigration earned significantly less than FE immigrants, while CE immigrant men who had worked in Canada with low earnings before immigration did not have a significant earnings advantage over FE immigrants. Only CE immigrants who had medium or high earnings had much higher earnings than FE immigrants. The post-immigration earnings of CE immigrant women without prior Canadian work experience were similar to those of FE immigrant women. However, as long as CE immigrant women had prior Canadian work experience, they surpassed FE immigrant women in post-immigration earnings by a wide margin.

Conditional on the earnings level in Canada before immigration, an extra year of Canadian work or education experience before immigration made little difference to post-immigration earnings for CE immigrants. These results may suggest that what matters to CE immigrants is not the length of Canadian work or study experience, but the realized market value of this experience, as indicated by the earnings level before immigration.

1 Introduction

The number of international students pursuing education in countries with advanced economies has been rising rapidly over recent decades. According to statistics for four English-speaking developed countries compiled by the United Nations Educational, Scientific and Cultural Organization (UNESCO), international students participating in tertiary education increased from 451,900 in 1999 to 784,000 in 2013 in the United States, from 232,500 to 416,700 in the United Kingdom, from 117,500 to 249,900 in Australia and from 32,500 to 135,200 (2012 statistics) in Canada.[1] Major receiving countries are becoming increasingly proactive in recruiting international students as a way to improve the financial health of educational institutions, attract talent and increase campus diversity (Choudaha and Chang 2012). These countries also increasingly regard international students as an important group of young and well-educated individuals from which to select permanent residents. In Canada, for example, about one-quarter of international students who arrived in the 1990s and 2000s transitioned into permanent residency within 10 years of obtaining their first study permit (Lu and Hou 2015).

There are many possible mechanisms through which Canadian education would benefit international students once they become permanent residents. One mechanism is the quality of education. Canadian education, particularly university education, is generally of higher quality and greater relevance to advanced economies than education received in the developing countries from which most contemporary immigrants to Canada originate (Bratsberg and Terrell 2002; Coulombe, Grenier and Nadeau 2014; Li and Sweetman 2014). A second mechanism is related to proficiency in English or French. Acquiring education in the receiving country would immerse international students in an environment that facilitates learning the official language of that country (Bleakley and Chin 2004; Bratsberg and Ragan 2002; Chiswick and Miller 1992). A third mechanism is acculturation (Tong 2010; Zeng and Xie 2004). Because they arrive younger and spend more years in Canada than foreign-educated (FE) immigrants, international students would gain better knowledge about the labour market and have more opportunities to establish social networks that could help their job search. Another possible mechanism is credentialism (Butcher 1994; Oreopoulos 2011; Painter 2013). Canadian employers are more familiar with Canadian educational qualifications than foreign ones and thus may prefer Canadian-educated (CE) immigrants over FE immigrants.

The above possible mechanisms have often been invoked to explain empirical findings that immigrants who received destination-country education outperform FE immigrants and even perform similarly to native-born workers in the labour market (e.g., Bratsberg and Terrell 2002; Zeng and Xie 2004). Some recent evidence, however, has raised doubts about the extent to which these mechanisms actually work for international students who become permanent residents. A few studies from Australia, Canada and the United States show that the earnings advantage of former international students over other economic immigrants is either small or non-existent (Birrell, Hawthorne and Richardson 2006; Hou and Bonikowska 2017; Lowell and Avato 2014).

These findings have supported recent changes in immigrant selection policies in Australia and Canada. In the late 1990s international students were regarded in Australia as ideal immigrant workers and were immediately eligible to immigrate. Policies were changed in the late 2000s, however, to restrict the study-to-immigration pathway to people with strong English proficiency, advanced degrees, employer sponsorship and work experience (Hawthorne and To 2014). In Canada the Canadian Experience Class was initially introduced in 2008 to provide a direct pathway to permanent residency for international students who graduated from Canadian postsecondary educational institutions and for skilled temporary foreign workers. This program was modified in 2013 to target people who have at least one year of skilled work experience in Canada, regardless of whether they pursued Canadian postsecondary education. In the newly

1. Based on statistics downloaded from the UNESCO Institute for Statistics in January 2016.

implemented Express Entry system for selecting economic immigrants, Canadian work experience is a key qualifying criterion, but Canadian study experience does not receive additional consideration (Bonikowska, Hou and Picot 2015).[2] A conviction underlying these selection policies is that destination-country study experience in and of itself is not necessarily an advantage. Instead, destination-country work experience—and, even more specifically, the earnings level—is a proven record that can be used to identify international students who will likely be successful in the labour market as permanent residents.

Given the large and rising number of international students in Western countries and the significant social and policy implications, a more comprehensive understanding of the study–immigration issue is needed (Hawthorne and To 2014; King and Raghuram 2013). This study uses three unique national longitudinal datasets to compare the earnings trajectories of immigrants who are former international students in Canada (CE immigrants), FE immigrants and the Canadian-born population. The study follows two cohorts of CE immigrants from the year when they became permanent residents. These immigrants had a university degree and were aged 25 to 34 when they became permanent residents. They are matched with the university-educated Canadian-born population and FE immigrants in the same age range. The focus on young university graduates allows for a clear comparison by immigration status and is also most relevant for policy issues related to the study-to-immigration transition.

This study asks two questions. First, do university-educated CE immigrants earn as much as Canadian-born university graduates both in the initial years after immigration and in the long term, and, if there is a large earnings gap between the two groups, what are the possible determinants? Second, do CE immigrants have a large earnings advantage over FE immigrants in the short and long term?

The results suggest that the key factor differentiating the post-immigration earnings of CE immigrants from the earnings of the Canadian-born population and FE immigrants is whether international students held a well-paid job in Canada before becoming permanent residents.

The remainder of this paper is organized in three sections. Section 2 consists of a discussion of the data sources, measures and analytical approaches. Section 3 presents descriptive statistics and multivariate analysis results. Section 4 concludes the paper.

2. In November 2016, the Canadian government modified the Comprehensive Ranking System that is used to screen applicants of skilled immigrants. Under the new system, applicants with a Canadian educational credential can receive up to 30 additional points. In comparison, an applicant with Canadian work experience can get up to 180 points conditional on whether he/she also had post-secondary education and foreign experience.

2 Data and methods

2.1 Data

Three data sources are used to construct the study samples of CE immigrants, FE immigrants and the Canadian-born population.

The sample of CE immigrants is drawn from the linkage of three files: the Temporary Residents File (TRF), the Immigrant Landing File (ILF), and the T1 personal tax file.[3] The TRF was created by Immigration, Refugees and Citizenship Canada (IRCC) and contains sociodemographic and administrative information on all temporary residents in Canada. Foreign students are identified among temporary residents as anyone who ever held a study permit issued by IRCC. The ILF contains the sociodemographic characteristics of permanent residents at the time of landing, including the highest level of completed education, age at immigration, class of immigration, official language and source country. The TRF–ILF linkage allows for the identification of former international students who made the transition into permanent residency. The T1 personal tax file includes annual information on income, taxes and some basic demographic characteristics, but it does not contain information on immigration status and education. The tax file covers the period from 1982 to 2013, which is the most recent year available at the time of this study.

The sample of FE immigrants is derived from the Longitudinal Immigration Database (IMDB). The IMDB combines immigrant landing records and annual tax records for all immigrants who have arrived in Canada since 1980 and who have filed at least one tax return since 1982. Those who filed a tax return before landing (i.e., who lived in Canada before becoming permanent residents) and those who arrived before the age of 25 are excluded from the analysis as a way to exclude immigrants who might have acquired education in Canada before becoming permanent residents. Some CE immigrants and FE immigrants may pursue further education in Canada after immigration, and the regression models in this study control for this (see Subsection 2.2).

The sample of Canadian-born workers is created from the linkage between the 20% sample file of the 1991 Census and the Longitudinal Worker File, which is a 10% random sample of the tax filing population, and the linkage between the 20% sample file of the 2006 Census (a subsample that could be linked to the 2011 National Household Survey [NHS]) and the T1 personal tax file. The census and NHS files allow the Canadian-born population and their educational attainment to be identified.

Common to all three data sources are the longitudinal earnings data from the tax file. The rate of tax filing in Canada is very high, and the T1 personal tax file covers up to 95% of the Canadian working age population (Finnie 2007). Most working age individuals file tax returns every year, so attrition over time is quite low relative to longitudinal survey data. Therefore, the T1 personal tax file is representative both cross-sectionally and longitudinally.

This study compares the earnings trajectories of university-educated individuals, by immigration status, in two "entry" cohorts: the 1991 cohort and the 2006 cohort.[4] The 1991 cohort includes the Canadian-born population aged 25 to 34 in 1991 (the census year), FE immigrants who arrived in Canada and were aged 25 to 34 in 1991, and CE immigrants who became landed immigrants

3. The three source files are linked together with the linkage control file (LCF) created by Statistics Canada. The LCF contains the social insurance numbers (SINs) of individuals, as well as basic demographic characteristics. Former temporary residents were probabilistically matched to the LCF based on their first and last names, date of birth, gender, postal code, claim date and family indicator from the TRF. The SINs of linked temporary residents were then obtained from the LCF, yielding a linkage key that contains both the Immigration, Refugees and Citizenship Canada client identification number and the SIN. Next, a deterministic linkage based on the SIN was established between these temporary residents and their filing records in the T1 file and the ILF.
4. Because only the microdata files for the 1991 Census and the 2006 Census were linked to the tax file at the time of the study, it is not possible to choose different cohorts for the Canadian-born population.

from 1990 to 1992 and were aged 25 to 34 in the year of landing. Three landing years are used for CE immigrants rather than one to increase the sample size. To ensure that CE immigrants who landed in different years are comparable with each other and with the Canadian-born population and FE immigrants, the study is restricted to a maximum of 20 years of follow-up, and regional economic conditions in each year when earnings were observed are controlled for, as are individual-level sociodemographic characteristics. Similarly, the 2006 cohort includes the Canadian-born population aged 25 to 34 in 2006, FE immigrants who arrived in Canada and were aged 25 to 34 in 2006, and CE immigrants who became landed immigrants from 2005 to 2007 and were aged 25 to 34 in the year of landing. This cohort is restricted to a maximum of six years of follow-up. All annual earnings are adjusted to 2013 constant dollars. In any given year, only people with at least $1,000 in annual earnings are included in regression model estimations.

2.2 Measures

The outcome variable is annual employment earnings, which include total wages or salaries and positive net self-employment income. The tax file does not contain information on working time (weeks or hours worked), so it is not possible to derive wage rates. Real annual earnings are top-coded at $300,000. The natural logarithm of real annual earnings is used in multivariate models. Since most immigrants cannot have a full year of employment in the calendar year when they first arrive, the earnings trajectories of all immigrants begin from the first full calendar year after immigration (e.g., for those who landed in 1991, 1992 was their first full year).

Three sets of explanatory variables are considered in accounting for group differences in earnings. One set is common to all three groups. The second set is specific to the Canadian-born population and CE immigrants, and the third is specific to CE and FE immigrants.

The first set includes age in the base year and its squared term, years since the base year and their squared term, months of full-time school attendance in each tax year[5] and educational level (bachelor's degree and graduate degree). It also includes official language (English, French and others), visible minority status (visible minority and non-visible minority)[6] and geographic region of residence in each tax year (Atlantic region, Quebec, Ontario, Manitoba and Saskatchewan, Alberta, and British Columbia). And, it includes macroeconomic conditions as measured by regional unemployment rates among the population of prime working ages in the year when earnings are observed.

The variables that are applicable only to the Canadian-born population and CE immigrants include years with positive earnings in Canada prior to the base year and the earnings level in Canada prior to the base year. The former is a conventional indicator of labour market work experience, while the latter represents the realized market value of individuals' job skills. The years with prior positive earnings are top-coded at 10, since information before 1982 is not available in the tax file. The level of prior earnings is measured as the maximum annual earnings prior to the base year in 2013 constant dollars, and it is coded into four categories: no prior earnings, low annual earnings ($20,000 or less), medium earnings ($20,000 to $50,000) and high earnings (over $50,000).

The variables that are applicable to both CE immigrants and FE immigrants include immigration class and several source-country characteristics. Immigration class is coded as skilled worker class, other economic class, family class, refugees and others. Previous Canadian studies have shown that labour market outcomes vary considerably by immigration class even after commonly measured human capital variables are controlled for (Hou and Picot 2014; Abbott and Beach

5. This variable is derived from the total education deduction an individual claimed for a year divided by the maximum amount that a person could claim for each month in a qualifying educational program.
6. For the Canadian-born population, this variable is based on a derived variable in the 1991 Census and self-identification in the 2006 Census. For CE and FE immigrants, it is based on source region. Immigrants who were born in Asia, Africa and Latin America are classified as belonging to a visible minority.

2011). Source-country characteristics include log gross domestic product (GDP) per capita (adjusted for purchasing power parity and measured in 2011 constant U.S. dollars),[7] quality of tertiary education (with scores ranging from 33 to 100),[8] whether English is an official language and whether French is an official language.

Finally, the TRF contains a variable that is specific to CE immigrants—years of Canadian study—which is measured as the number of years in which a valid study permit was held in the 10 years prior to landing. This variable is used to capture the general acculturation effect. CE immigrants in this study all had a Canadian university education. When the educational level is controlled for (i.e., bachelor's degree versus graduate degree), more years of studying in Canada are likely associated with a high degree of acculturation in terms of mastering one or both of the official languages, establishing social networks, and gaining knowledge about the Canadian labour market and society.

2.3 Methods

Descriptive statistics are first produced to show the overall differences among the Canadian-born population, CE immigrants and FE immigrants in earnings trajectories and sociodemographic characteristics. Multivariate regression models are estimated to examine the extent to which the observed group differences in earnings can be accounted for by group differences in sociodemographic characteristics. To simplify the presentation, separate models are estimated to compare CE immigrants with the Canadian-born population and to compare CE immigrants with FE immigrants, since some key explanatory variables are not available for all three groups.

Three sequential models are constructed to compare CE immigrants with Canadian-born workers:

$$\text{Log earnings} = \beta_{ce} * CE + \beta_{ys} * YS + \beta_{ys2} * YS^2 + \beta_{cys} * CE * YS + \beta_{cys2} * CE * YS^2 + e \quad (1)$$

$$\text{Log earnings} = \beta_{ce} * CE + \beta_{ys} * YS + \beta_{ys2} * YS^2 + \beta_{cys} * CE * YS + \beta_{cys2} * CE * YS^2 + \beta_x * X + e \quad (2)$$

$$\text{Log earnings} = \beta_{ce} * CE + \beta_{ys} * YS + \beta_{ys2} * YS^2 + \beta_{cys} * CE * YS + \beta_{cys2} * CE * YS^2 + \beta_x * X + \beta_p * P + e \quad (3)$$

7. For the 1991 cohort of immigrants, the average of the yearly GDP per capita over the 1990s is used. For the 2006 cohort, the average of the yearly GDP per capita over the 2000s is used. As Li and Sweetman (2014) convincingly argue, the average over a period is a more reliable indicator of the relative ranking across countries than yearly data. The data were downloaded from the World Bank (2016).
8. The quality of tertiary education in the source country is based on the U21 Ranking of National Higher Education Systems, an international project sponsored by Universitas 21 and based at the University of Melbourne (see Williams et al. 2015). The ranking evaluates the higher education system of a country as a whole on the basis of 25 attributes in four modules: resources, environment, connectivity and output. Ranking results were first available in 2012 for 48 countries and were expanded in 2013 to 50 countries covering all continents and various development stages. This study uses the 2013 results. Regression models were used to extend the ranking to other countries that are not included in the ranking system. First, for the 50 countries with ranking results, the ranking scores were regressed on three main indicators: government expenditure per tertiary student in constant purchasing parity prices (downloaded from the UNESCO Institute for Statistics (UNESCO n.d.); the average impact of articles, as measured by citations in the 1996-to-1999 period to articles published in previous years; and the 1996-to-1999 average of the h-index, which measures both the productivity and the impact of scientific publications. Both the citation index and the h-index were downloaded from the Scimago Journal and Country Rank (SJR n.d.). The regression equation accounts for 78% of the variation in ranking scores across the 50 countries. This equation was then used to predict the ranking scores for other countries that are not included in the U21 project. The resultant score is strongly correlated (Pearson's $r = 0.46$) with the average earnings of recent immigrants with a university degree, by source country, derived from the 2011 NHS.

Model 1 replicates the observed differences in log earnings trajectories between CE immigrants and the Canadian-born population, with the assumption that the earnings growth takes a quadratic function of years since the base year (YS) and the quadratic function is different between the two groups. CE is a dummy variable (CE immigrants = 1, and the Canadian-born population = 0). Model 2 adds in sociodemographic and macroeconomic conditions (X) as discussed above in Subsection 2.2. Model 3 adds in years of work experience and the earnings level (P) in Canada prior to the base year.

Similarly, three models are estimated to compare CE and FE immigrants, with two differences. Model 2 also includes immigration class and source-country characteristics, which are specific to immigrants. In Model 3, years of work experience, the earnings level in Canada prior to the base year and years of Canadian study are added. These variables are not available for FE immigrants and thus should be interpreted as conditional interaction terms.

Although individuals are followed longitudinally starting from the base year in the study data, these data are not a balanced panel consisting of individuals who were employed in all years. The advantage of using this unbalanced panel is that the analysis can capture all individuals who ever worked in any given year, thus providing a fuller picture of the economic performance of immigrants. This is particularly important for CE immigrants, who are more likely to pursue further studies after the base year than FE immigrants and the Canadian-born population (as shown below in Tables 1 and 2). To check the robustness of the results, the analyses are also conducted for a more restricted sample: individuals who had non-trivial annual earnings (i.e., over $1,000) in at least 15 years (out of a possible 20 total years of observation) for the 1991 cohort and in at least 4 years (out of a maximum of 6 years) for the 2006 cohort. The conclusions on group differences in earnings trajectories from these restrictive samples are essentially the same as those from the unbalanced sample.

In regression models, cluster-robust standard errors are estimated to correct the independence among multiple observations of the same individual. Alternatively, random effects models are estimated and the results are broadly similar.[9] All models are estimated separately for men and women.

3 Empirical results

3.1 Group differences in explanatory factors and earnings

Table 1 presents descriptive statistics that show differences in explanatory variables between university-educated Canadian-born men, CE immigrant men and FE immigrant men for the 1991 and 2006 cohorts. Table 2 is for women.

Compared with the other two groups, CE immigrants tended to be slightly younger by half a year to one and a half years, depending on cohort and gender. A much higher share of them had a graduate degree, and they were more likely to undertake further education after the base year. CE immigrants were also more likely to belong to visible minority groups. For instance, in the 2006 cohort, 85% of CE immigrant men belonged to a visible minority, while the corresponding share was 10% for Canadian-born men and 79% for FE immigrants. These group differences were similar in the 1991 and 2006 cohorts.

9. The model coefficients for variables related to the comparison differ mostly in the second digit after the decimal point. However, the effects of some aggregate variables tend to be stronger in random effects models, particularly the negative effect of regional unemployment rates.

Table 1
Means of variables, by immigration status, men with a university degree aged 25 to 34 in the base year, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Canadian-born men	Canadian-educated immigrants	Foreign-educated immigrants	Canadian-born men	Canadian-educated immigrants	Foreign-educated immigrants
			mean			
First-year earnings (2013 constant dollars)	60,303	31,025	24,294	63,099	36,730	31,343
Log first-year earnings	10.77	9.98	9.74	10.80	10.14	10.05
Years since the base year	10.36	9.46	10.12	3.50	3.43	3.52
Age in the base year	29.66	29.10	29.51	29.41	28.42	30.23
Regional unemployment rate (percentage)	7.29	7.06	6.82	5.96	5.98	5.99
Years of prior Canadian work experience	7.04	2.97	...	7.34	3.16	...
Years of Canadian study	...	3.96	...	...	3.84	...
Origin-country tertiary education quality index	...	50.15	47.16	...	46.27	43.89
Origin-country log gross domestic product per capita	...	8.00	7.77	...	7.63	7.44
Graduate degrees	0.25	0.49	0.21	0.24	0.45	0.33
Months of study in a year	0.08	0.29	0.12	0.58	1.62	0.60
French	0.33	0.06	0.05	0.25	0.04	0.04
Other languages	...	0.03	0.23	...	0.01	0.08
Visible minorities	0.04	0.91	0.76	0.10	0.85	0.79
Atlantic region	0.07	0.03	0.01	0.06	0.03	0.01
Quebec	0.28	0.19	0.16	0.23	0.25	0.23
Manitoba and Saskatchewan	0.06	0.04	0.02	0.06	0.04	0.04
Alberta	0.11	0.10	0.08	0.11	0.15	0.13
British Columbia	0.09	0.17	0.18	0.11	0.13	0.13
Skilled worker class	...	0.62	0.29	...	0.77	0.69
Other economic class	...	0.03	0.06	...	0.05	0.10
Family class	...	0.25	0.43	...	0.14	0.19
Refugees	...	0.10	0.21	...	0.04	0.02
Origin-country official language English	...	0.29	0.51	...	0.30	0.41
Origin-country official language French	...	0.08	0.03	...	0.15	0.07
No prior earnings in Canada	0.01	0.09	...	0.00	0.12	...
Low prior earnings	0.08	0.40	...	0.11	0.40	...
Medium prior earnings	0.29	0.37	...	0.32	0.35	...
High prior earnings	0.62	0.14	...	0.57	0.14	...
			number			
Sample size (unique persons)	4,523	3,176	4,191	7,714	7,730	9,615
Person-years	79,574	37,872	56,836	43,788	37,660	48,265

... not applicable

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Table 2
Means of variables, by immigration status, women with a university degree aged 25 to 34 in the base year, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Canadian-born women	Canadian-educated immigrants	Foreign-educated immigrants	Canadian-born women	Canadian-educated immigrants	Foreign-educated immigrants
			mean			
First-year earnings (2013 constant dollars)	44,506	26,086	19,130	47,677	30,677	20,855
Log first-year earnings	10.45	9.78	9.50	10.52	9.97	9.58
Years since the base year	10.45	9.81	10.55	3.50	3.41	3.54
Age in the base year	29.49	28.57	29.15	29.36	28.03	29.37
Regional unemployment rate (percentage)	7.25	6.94	6.66	6.07	5.99	5.95
Years of prior Canadian work experience	6.97	2.59	...	7.48	3.09	...
Years of Canadian study	...	3.55	...	...	3.92	...
Origin-country tertiary education quality index	...	54.19	48.51	...	49.85	44.55
Origin-country log gross domestic product per capita	...	8.42	7.93	...	8.07	7.53
Graduate degrees	0.24	0.34	0.17	0.26	0.40	0.30
Months of study in a year	0.10	0.23	0.14	0.51	1.39	0.62
French	0.30	0.05	0.04	0.28	0.03	0.04
Other languages	0.00	0.04	0.24	0.00	0.01	0.11
Visible minorities	0.04	0.85	0.71	0.09	0.80	0.75
Atlantic region	0.08	0.02	0.01	0.08	0.02	0.01
Quebec	0.26	0.16	0.13	0.26	0.24	0.21
Manitoba and Saskatchewan	0.06	0.04	0.04	0.05	0.04	0.05
Alberta	0.10	0.07	0.07	0.10	0.11	0.13
British Columbia	0.09	0.19	0.18	0.11	0.18	0.15
Skilled worker class	...	0.43	0.15	...	0.58	0.35
Other economic class	...	0.16	0.20	...	0.10	0.33
Family class	...	0.33	0.48	...	0.28	0.31
Refugees	...	0.08	0.18	...	0.04	0.02
Origin-country official language English	...	0.36	0.54	...	0.18	0.41
Origin-country official language French	...	0.06	0.02	...	0.13	0.05
No prior earnings in Canada	0.01	0.14	...	0.00	0.16	...
Low prior earnings	0.09	0.43	...	0.11	0.42	...
Medium prior earnings	0.41	0.35	...	0.41	0.33	...
High prior earnings	0.48	0.08	...	0.47	0.09	...
			number			
Sample size (unique persons)	4,716	1,661	3,353	11,564	5,912	9,629
Person-years	80,635	20,005	44,300	64,446	27,304	42,614

... not applicable

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

The average months of study in the earnings year increased for all three groups from the 1991 cohort to the 2006 cohort. This increase was due to two factors. First, the latter cohort was followed for only 6 years, while the former was followed for 20 years. The likelihood of undertaking additional study was higher in the first few years in the follow-up.[10] Second, there was an increase in the average months of study for a given follow-up year between the 1991 and 2006 cohorts. For instance, in the first follow-up year, the average months of study increased from 0.15 to 0.92 for Canadian-born men, from 0.81 to 3.12 for CE immigrants and from 0.15 to 0.65 for FE immigrants.

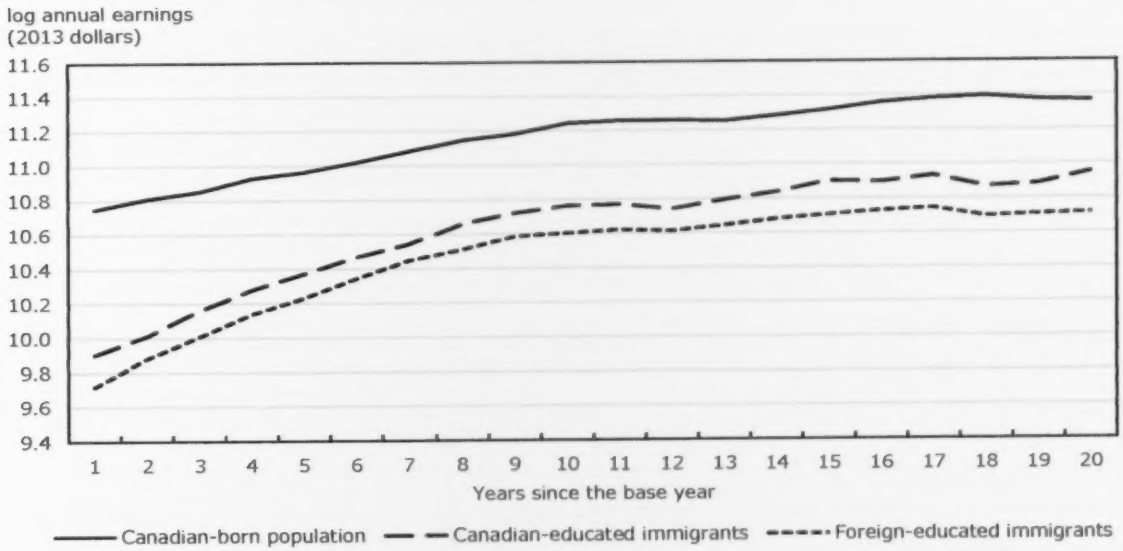
Relative to the Canadian-born population, proportionally more CE immigrants did not work or had low earnings in Canada. For instance, in the 2006 cohort, about 14% of CE immigrant men had high earnings in Canada before the base year, compared with 62% of Canadian-born men. About 12% of CE immigrant men never worked in Canada before the base year, while almost all Canadian-born men had positive earnings in at least one year. CE immigrants also had about four fewer years of work experience in Canada than the Canadian-born population. These gaps in work history could result from a variety of factors: pursuing education beyond the bachelor's level at a higher rate, starting Canadian university education at a later age and having more difficulties in finding a job after graduation.

Relative to FE immigrants, CE immigrants were more likely to be admitted in the skilled worker class, particularly in the 1991 cohort. CE immigrants tended to come from countries with higher-quality tertiary education and a higher GDP per capita, but they were less likely to come from countries with English as an official language. Essentially all CE immigrants could speak an official language of Canada, but 8% of FE immigrant men and 11% of FE immigrant women could not in the 2006 cohort.

Charts 1 to 4 present earnings trajectories among individuals with only a bachelor's degree by immigration status, sex and cohort. Since a much higher share of CE immigrants have a graduate degree, comparing earnings at the same educational level could take into account group differences in educational level. Charts for individuals with a graduate degree showed similar patterns and are not reproduced here.

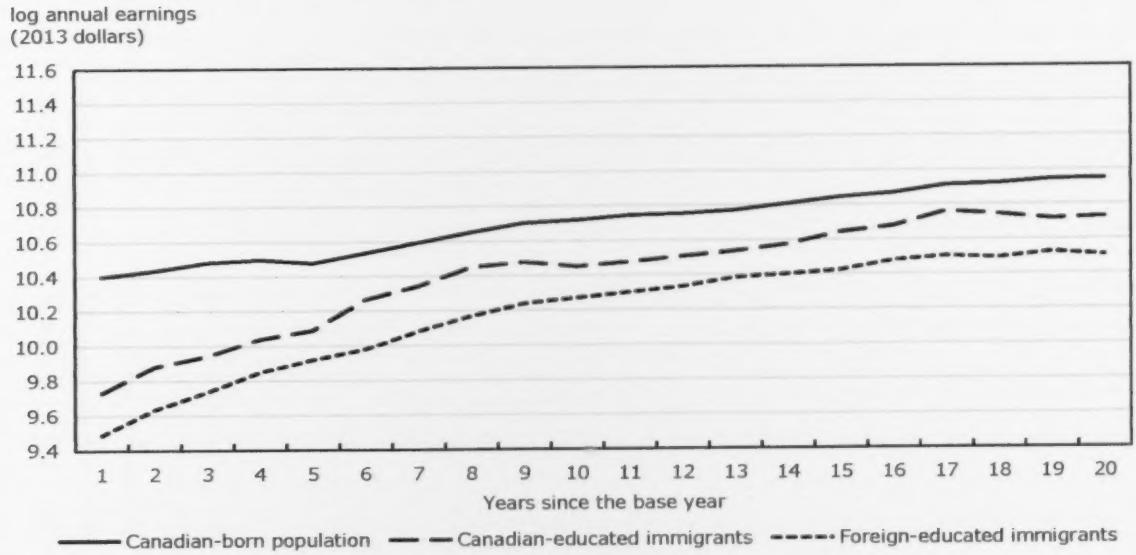
10. For instance, the average months of study changed from 0.81 in the first year after the base year to 0.30 in the fifth year for CE immigrant men and from 0.15 to 0.08 for Canadian-born men in the 1991 cohort. For FE immigrants, the average increased from 0.15 in the first year after immigration to 0.19 in the second year and gradually decreased to 0.14 by the fifth year.

Chart 1
Log annual earnings of male workers with a bachelor's degree, by immigration status, 1991 cohort



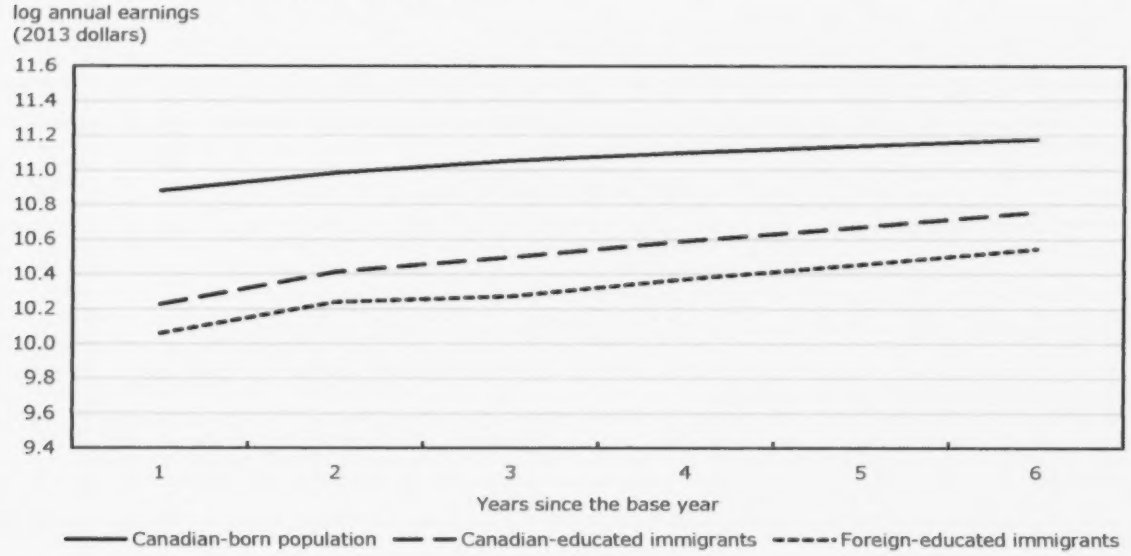
Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Chart 2
Log annual earnings of female workers with a bachelor's degree, by immigration status, 1991 cohort



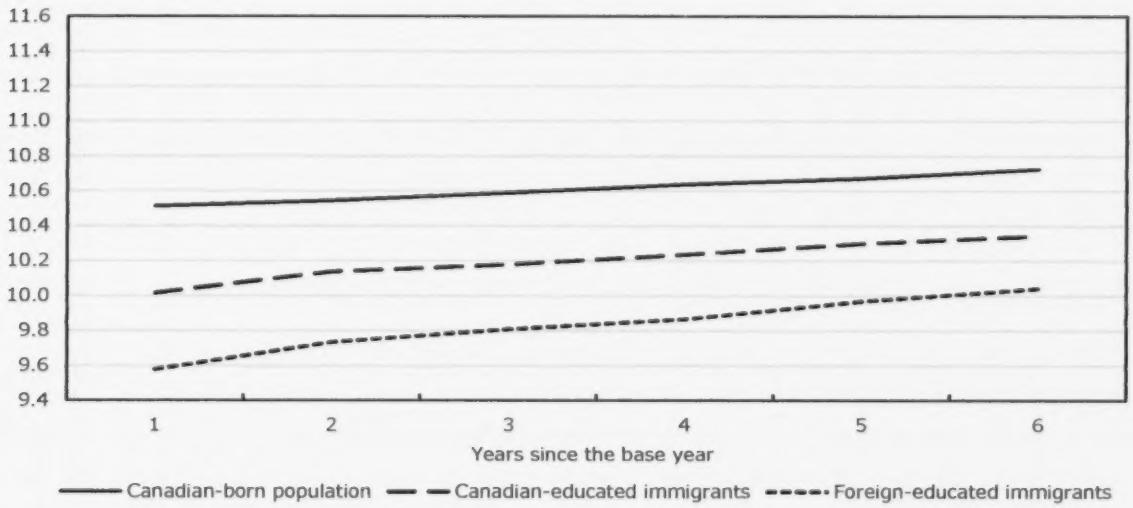
Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Chart 3
Log annual earnings of male workers with a bachelor's degree, by immigration status, 2006 cohort



Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Chart 4
Log annual earnings of female workers with a bachelor's degree, by immigration status, 2006 cohort



Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

In Chart 1, CE immigrant men with a bachelor's degree in the 1991 cohort had a very large earnings gap, at -0.84 log point, relative to Canadian-born men with the same level of education (i.e., CE immigrants earned 43% of the average earnings of Canadian-born men $\lfloor \exp(-0.84) = 43\% \rfloor$) in the first year after the base year. The gap narrowed to -0.37 log point 10 years after the base year (i.e., CE immigrants earned 69% of the average earnings of Canadian-born men); the gap stabilized afterwards. Relative to FE immigrants, CE immigrant men had higher initial earnings, by 0.19 log point (or about 21%), and the advantage barely changed over the 20-year follow-up period.

Similar patterns of group differences were observed for women in Chart 2. Relative to their male counterparts, CE immigrant women had a smaller gap in earnings with the Canadian-born population, while their advantage over FE immigrants in earnings was somewhat larger. CE immigrant women had a large earnings gap, at -0.67 log point, relative to Canadian-born women with the same education level (or 49% lower than the average for Canadian-born women) in the first year. This gap narrowed to -0.27 log point (or 20% lower than the average for Canadian-born women) by the 10th year and remained stable afterwards.

The patterns of group differences in earnings trajectories for the 2006 cohort (Charts 3 and 4) are broadly similar to those for the 1991 cohort. One discernible change is that the advantage of CE immigrant women relative to FE immigrant women was larger in the 2006 cohort than in the 1991 cohort. This is because CE immigrants experienced a much larger increase in earnings between the 1991 and 2006 cohorts than FE immigrant women.

3.2 Comparing Canadian-educated immigrants with the Canadian-born population

Table 3 presents the results of multivariate regression models that compare the earnings of university-educated CE immigrant men and Canadian-born men and factors associated with their earnings gaps for the 1991 and 2006 cohorts. Table 4 presents the same models for women.

The first three models in Table 3 were estimated for the 1991 cohort. Model 1 shows that there was a very large initial earnings gap between CE immigrant men and Canadian-born men (-0.760 log point, or CE immigrants earned about 46% of what Canadian-born men earned). The earnings of CE immigrant men grew more rapidly, as indicated by the positive interaction term between CE immigrants and years since the base year. However, they could not catch up with those of the Canadian-born population because their growth rate started to level off after about 10 years, as indicated by the negative interaction term between CE immigrants and squared years since the base year. When the sociodemographic control variables were added for Model 2, the initial earnings gap of CE immigrants decreased from -0.760 to -0.549 log point. This decrease in the estimated earnings gap was mostly attributable to the high share of visible minorities among CE immigrants; visible minorities had a large earnings gap (-0.193 log point) with the white group.

When variables representing work history before the base year were added for Model 3, the initial earnings gap of CE immigrants was further reduced to -0.245 log point. Having high earnings before the base year was associated with a very large earnings advantage (0.800 log point), while having medium earnings before the base year was associated with a moderate earnings advantage (0.241 log point). In contrast, having low earnings before the base year was not associated with any significant earnings advantage after the base year. One year of Canadian work experience before the base year was associated with higher earnings of 0.030 log point in the years after the base year. The effect of the earnings level in Canada before immigration was about three times as large as the effect of years of prior work experience, in terms of the contribution to the decrease in the earnings gap of CE immigrants from Model 2 to Model 3.[11] In addition, the large and significant coefficient of visible minority status in Model 2 became non-significant in Model 3. This change suggests that a lower share of people who belong to a visible minority had high earnings in the early stage of their careers.

The three models in the right panel were estimated for CE immigrant men and Canadian-born men in the 2006 cohort. As with the 1991 cohort, the earnings gap of CE immigrants became smaller from Model 1 to Model 2 and was further reduced from Model 2 to Model 3, becoming not statistically significant. The reduction in the gap from Model 1 to Model 2 was mostly attributable to the inclusion of visible minority status and months of study, as most CE immigrants belonged to a visible minority, and they spent more months studying after the base year than the Canadian-born population. The decrease in the earnings gap from Model 2 to Model 3 was almost entirely attributable to the earnings level before immigration. Years of prior work experience were not a significant predictor of earnings for the 2006 cohort. Compared with the results for the 1991 cohort, the effect of the earnings level before immigration became much stronger for the 2006 cohort. Even individuals with low earnings had a significant earnings advantage over those who did not work before the base year.

11. This observation is derived from a decomposition analysis based on group differences in these characteristics and the regression coefficients associated with these characteristics (see Hou [2014] for details).

Table 3
Regression models comparing earnings between Canadian-educated immigrant men and Canadian-born men with a university degree, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	coefficient					
Canadian-educated immigrants	-0.760 ***	-0.549 ***	-0.245 ***	-0.660 ***	-0.324 ***	0.003
Years since the base year	0.074 ***	0.066 ***	0.068 ***	0.101 ***	0.089 ***	0.098 ***
Squared years since the base year	-0.002 ***	-0.002 ***	-0.002 ***	-0.007 ***	-0.006 ***	-0.007 ***
Canadian-educated immigrants interacted with years since the base year	0.071 ***	0.056 ***	0.062 ***	0.105 ***	0.032 ***	0.055 ***
Canadian-educated immigrants interacted with squared years since the base year	-0.003 ***	-0.002 ***	-0.002 ***	-0.007 **	-0.002	-0.004 *
Age in the base year	...	0.183 **	-0.070	...	0.103	-0.105
Age squared	...	-0.003 **	0.001	...	-0.001	0.002
Graduate degrees	...	0.227 ***	0.218 ***	...	0.144 ***	0.149 ***
Months of study in a year	...	-0.180 ***	-0.157 ***	...	-0.101 ***	-0.084 ***
French	...	0.006	0.007	...	0.099 **	0.059 *
Other languages	...	-0.273 **	-0.211 **	...	-0.379 ***	-0.207 *
Visible minorities	...	-0.193 ***	-0.036	...	-0.125 **	-0.057
Atlantic region	...	-0.193 ***	-0.122 ***	...	-0.107 **	-0.051 *
Quebec	...	-0.219 ***	-0.129 ***	...	-0.287 **	-0.143 ***
Manitoba and Saskatchewan	...	-0.247 ***	-0.186 ***	...	-0.040	0.004
Alberta	...	-0.017	0.005	...	0.216 ***	0.194 ***
British Columbia	...	-0.207 ***	-0.157 ***	...	-0.116 ***	-0.081 ***
Regional unemployment rate	...	-0.010 **	-0.009 *	...	-0.007	-0.014 ***
Low prior earnings	...	...	0.039	...	...	0.181 ***
Medium prior earnings	...	...	0.241 ***	...	...	0.559 ***
High prior earnings	...	...	0.800 ***	...	...	1.130 ***
Years of prior Canadian work experience	...	...	0.030 ***	...	...	0.010
Intercept	10.758 ***	8.099 ***	11.438 ***	10.807 ***	9.114 ***	11.631 ***

... not applicable

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

Note: The model R-squared is 0.150, 0.208 and 0.312 in Models 1, 2 and 3, respectively, for the 1991 cohort; it is 0.108, 0.257 and 0.393 in Models 1, 2 and 3, respectively, for the 2006 cohort.

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

The results of the multivariate models comparing CE immigrant women and Canadian-born women in Table 4 are generally similar to those for men. One noticeable difference for women is that visible minority status was not associated with an earnings disadvantage for either the 1991 cohort or the 2006 cohort. As a result, controlling for visible minority status made very little change in the earnings gap of CE immigrant women from Model 1 to Model 2 in the 1991 cohort. The relatively large decrease in the earnings gap of CE immigrants from Model 1 to Model 2 for the 2006 cohort was due mostly to the group difference in months of study. As with men, the disadvantages in the earnings level before the base year and in the years of work experience before the base year accounted for about one-half for the 1991 cohort or essentially all for the 2006 cohort of the earnings gap of CE immigrant women. In terms of the contribution to the earnings gap, the effect of the earnings level was about five times that of years of Canadian work experience for both the 1991 cohort and the 2006 cohort.

Table 4

Regression models comparing earnings between Canadian-educated immigrant women and Canadian-born women with a university degree, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	coefficient					
Canadian-educated immigrants	-0.617 ***	-0.624 ***	-0.343 ***	-0.540 ***	-0.374 ***	-0.021
Years since the base year	0.040 ***	0.038 ***	0.037 ***	0.060 ***	0.046 ***	0.052 ***
Squared years since the base year	0.000 ***	0.000 **	0.000 *	-0.002	-0.001	-0.001
Canadian-educated immigrants interacted with years since the base year	0.071 ***	0.067 ***	0.070 ***	0.061 ***	0.032 *	0.047 ***
Canadian-educated immigrants interacted with squared years since the base year	-0.003 ***	-0.003 ***	-0.003 ***	-0.005	-0.004	-0.005 *
Age in the base year	...	-0.054	-0.270 ***	...	-0.164 **	-0.290 ***
Age squared	...	0.001	0.004 ***	...	0.003 **	0.005 ***
Graduate degrees	...	0.276 ***	0.235 ***	...	0.201 ***	0.170 ***
Months of study in a year	...	-0.109 ***	-0.091 ***	...	-0.087 ***	-0.074 ***
French	...	0.082 **	0.093 ***	...	0.103 ***	0.071 **
Other languages	...	-0.178	-0.107	...	-0.163	0.005
Visible minorities	...	0.046	0.144 ***	...	-0.020	0.020
Atlantic region	...	-0.148 ***	-0.086 *	...	-0.060 *	0.015
Quebec	...	-0.151 ***	-0.065 *	...	-0.253 ***	-0.125 ***
Manitoba and Saskatchewan	...	-0.211 ***	-0.168 ***	...	-0.057 *	-0.024
Alberta	...	-0.067 *	-0.088 **	...	0.066 *	0.047
British Columbia	...	-0.167 ***	-0.106 ***	...	-0.127 ***	-0.071 **
Regional unemployment rate	...	-0.003	-0.007	...	-0.007	-0.009 *
Low prior earnings	...	...	0.078	...	...	0.252 ***
Medium prior earnings	...	...	0.355 ***	...	...	0.573 ***
High prior earnings	...	...	0.822 ***	...	...	1.078 ***
Years of prior Canadian work experience	...	...	0.015 *	...	...	0.017 **
Intercept	10.448 ***	11.086 ***	13.935 ***	10.522 ***	12.881 ***	14.172 ***

... not applicable

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

Note: The model R-squared is 0.077, 0.115, and 0.201 in Models 1, 2 and 3, respectively, for the 1991 cohort; it is 0.066, 0.146, and 0.250 in Models 1, 2 and 3, respectively, for the 2006 cohort.

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

3.3 Comparing Canadian-educated and foreign-educated immigrants

Table 5 presents the results of multivariate regression models that compare the earnings of university-educated CE and FE immigrant men and factors associated with their earnings gaps for the 1991 and 2006 cohorts.

The three models in the left panel in Table 5 are for the 1991 cohort. CE immigrant men had higher initial earnings (0.210 log point) and a higher growth rate (about 0.012 log point per year) than FE immigrants. After sociodemographic characteristics and source-country attributes were controlled for in Model 2, the initial earnings advantage of CE immigrants narrowed slightly to 0.177 log point, and they no longer had a higher growth rate relative to FE immigrants. These changes were attributable mostly to the larger share of CE immigrants with a graduate degree and the smaller share not speaking English or French. Although the included source-country attributes did not contribute much to the earnings differences between CE and FE immigrants, they were significant predictors of the earnings of university-educated immigrants. In particular, a 10% increase in source-country GDP per capita (adjusted for purchasing power parity) was associated with a 0.53% increase in immigrant earnings. Immigrants from source countries with English or French as the (or an) official language earned more than those from countries with another language as the official language. The negative effect of the quality of tertiary education in the source country seemed counterintuitive. This was because of the control of source-country GDP per capita. Without such a control, the effect of the quality of tertiary education in the source country was positive and moderate.[12]

When the conditional interaction terms of work history and years of study in Canada among CE immigrants (variables that do not apply to FE immigrants, as mentioned in Subsection 2.3) were included in Model 3 for the 1991 cohort (Table 5), the coefficient for CE immigrants became negative and significant at -0.208 log point. This negative coefficient implies that CE immigrants who did not have any Canadian work history before they became permanent residents earned significantly less than otherwise observably equivalent FE immigrants. This point is further illustrated in Table 7, which presents the estimated earnings gap between FE immigrants and CE immigrants with various combinations of Canadian work history and years of study in Canada, based on the regression coefficients in Model 3. The choice of four years of study in Canada and three years of Canadian work experience before immigration for CE immigrants in the estimation was based on the observed averages for these two variables as reported in Tables 1 and 2.

12. When source-country GDP per capita was not controlled for, the coefficient of the quality of tertiary education in the source country was 0.003 for the 1991 cohort. Thus, the earnings difference between immigrants from countries with medium-level education quality (with a quality score of 50) and those from the country with the highest education quality (the United States, with a score of 100) would be 0.003 * 50 = 0.15 log point, or about 16%. For the 2006 cohort, the coefficient of the quality of tertiary education in the source country was 0.004 without controlling for source-country GDP per capita. These estimates are based on the combined sample of CE and FE immigrants. The analysis in the next section shows that this education quality indictor is not associated with the earnings of CE immigrants but is strongly associated with the earnings of FE immigrants.

Table 5
Regression models comparing earnings between Canadian-educated immigrant men and foreign-educated immigrant men with a university degree, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	coefficient					
Canadian-educated immigrants	0.210 ***	0.177 ***	-0.208 ***	0.072 ***	0.250 ***	-0.138 ***
Years since the base year	0.133 ***	0.114 ***	0.114 ***	0.124 ***	0.176 ***	0.180 ***
Squared years since the base year	-0.005 ***	-0.004 ***	-0.004 ***	-0.006 ***	-0.016 ***	-0.016 ***
Canadian-educated immigrants interacted with years since the base year	0.012 *	0.001	0.004	0.081 ***	-0.020 *	-0.007
Canadian-educated immigrants interacted with squared years since the base year	0.000	0.000	0.000	-0.008 ***	0.003	0.002
Age in the base year	...	0.084	0.076	...	0.103 *	0.091 *
Age squared	...	-0.002	-0.001	...	-0.002 **	-0.002 *
Graduate degrees	...	0.246 ***	0.203 ***	...	0.070 ***	0.060 ***
Months of study in a year	...	-0.150 ***	-0.141 ***	...	-0.091 ***	-0.086 ***
French	...	-0.161 **	-0.150 ***	...	-0.075 **	-0.072 **
Other languages	...	-0.299 ***	-0.301 ***	...	-0.265 ***	-0.263 ***
Visible minorities	...	-0.282 ***	-0.276 ***	...	-0.105 ***	-0.076 ***
Atlantic region	...	0.111	0.116	...	0.154 ***	0.130 ***
Quebec	...	-0.177 ***	-0.162 ***	...	-0.213 ***	-0.161 ***
Manitoba and Saskatchewan	...	-0.103 **	-0.094 *	...	0.007	0.007
Alberta	...	-0.018	-0.025	...	0.247 ***	0.228 ***
British Columbia	...	-0.194 ***	-0.180 ***	...	-0.036 *	-0.037 *
Regional unemployment rate	...	-0.028 ***	-0.028 ***	...	-0.032 ***	-0.036 ***
Other economic class	...	-0.096 *	-0.068	...	-0.147 ***	-0.117 ***
Family class	...	-0.196 ***	-0.159 ***	...	-0.233 ***	-0.177 ***
Refugees	...	-0.180 ***	-0.183 ***	...	-0.422 ***	-0.389 ***
Origin-country tertiary education quality	...	-0.004 **	-0.002 *	...	0.000	0.000
Origin-country log gross domestic product per capita	...	0.053 ***	0.041 ***	...	0.050 ***	0.044 ***
Origin-country official language English	...	0.187 ***	0.119 ***	...	0.139 ***	0.103 ***
Origin-country official language French	...	0.102 *	0.109 *	...	0.039 *	0.075 ***
Low prior earnings	...	...	0.110	...	...	0.221 ***
Medium prior earnings	...	...	0.288 ***	...	...	0.539 ***
High prior earnings	...	...	0.690 ***	...	...	0.972 ***
Years of prior Canadian work experience	...	...	0.023 *	...	...	0.012 *
Years of Canadian study	...	...	0.015 *	...	...	-0.020 ***
Intercept	9.788 ***	9.124 ***	9.319 ***	10.075 ***	8.796 ***	8.956 ***

... not applicable

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

Note: The model R-squared is 0.132, 0.214 and 0.235 in Models 1, 2 and 3, respectively, for the 1991 cohort; it is 0.054, 0.194 and 0.236 in Models 1, 2 and 3, respectively, for the 2006 cohort.

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Table 6
Regression models comparing earnings between Canadian-educated immigrant women and foreign-educated immigrant women with a university degree, 1991 and 2006 cohorts

	1991 cohort			2006 cohort		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
	coefficient					
Canadian-educated immigrants	0.290 ***	0.211 ***	-0.062	0.384 ***	0.422 ***	0.049
Years since the base year	0.108 ***	0.098 ***	0.098 ***	0.114 ***	0.148 ***	0.153 ***
Squared years since the base year	-0.003 ***	-0.002 ***	-0.003 ***	-0.005 ***	-0.011 ***	-0.012 ***
Canadian-educated immigrants interacted with years since the base year	0.004	-0.002	0.001	0.007	-0.053 ***	-0.042 ***
Canadian-educated immigrants interacted with squared years since the base year	0.000	0.000	0.000	-0.002	0.004	0.003
Age in the base year	...	0.082	0.068	...	-0.059	-0.045
Age squared	...	-0.001	-0.001	...	0.001	0.001
Graduate degrees	...	0.188 ***	0.160 ***	...	0.050 ***	0.037 **
Months of study in a year	...	-0.090 ***	-0.085 ***	...	-0.077 ***	-0.072 ***
French	...	-0.046	-0.040	...	-0.100 ***	-0.117 ***
Other languages	...	-0.323 ***	-0.329 ***	...	-0.206 ***	-0.204 ***
Visible minorities	...	-0.127 **	-0.128 ***	...	-0.073 ***	-0.072 ***
Atlantic region	...	-0.277 **	-0.219 *	...	0.073	0.066
Quebec	...	-0.210 ***	-0.188 ***	...	-0.232 ***	-0.179 ***
Manitoba and Saskatchewan	...	-0.223 ***	-0.200 ***	...	0.023	0.019
Alberta	...	-0.076 *	-0.075 *	...	0.173 ***	0.140 ***
British Columbia	...	-0.140 ***	-0.125 ***	...	-0.066 ***	-0.061 ***
Regional unemployment rate	...	-0.019 ***	-0.019 **	...	-0.016 **	-0.020 ***
Other economic class	...	-0.165 ***	-0.136 ***	...	-0.317 ***	-0.283 ***
Family class	...	-0.267 ***	-0.241 ***	...	-0.384 ***	-0.320 ***
Refugees	...	-0.248 ***	-0.232 ***	...	-0.525 ***	-0.457 ***
Origin-country tertiary education quality	...	-0.004 **	-0.003 *	...	0.001	0.000
Origin-country log gross domestic product per capita	...	0.059 ***	0.045 **	...	0.052 ***	0.046 ***
Origin-country official language English	...	0.104 ***	0.066 *	...	0.073 ***	0.055 ***
Origin-country official language French	...	-0.122 *	-0.121 *	...	0.019	0.042
Low prior earnings	...	...	0.101	...	...	0.245 ***
Medium prior earnings	...	...	0.328 ***	...	...	0.550 ***
High prior earnings	...	...	0.756 ***	...	...	0.994 ***
Years of prior Canadian work experience	...	...	-0.005	...	...	-0.001
Years of Canadian study	...	...	0.016 *	...	...	-0.002
Intercept	9.541 ***	8.565 ***	8.869 ***	9.598 ***	10.545 ***	10.368 ***

... not applicable

* significantly different from reference category ($p < 0.05$)

** significantly different from reference category ($p < 0.01$)

*** significantly different from reference category ($p < 0.001$)

Note: The model R-squared is 0.117, 0.171 and 0.184 in Models 1, 2 and 3, respectively, for the 1991 cohort; it is 0.056, 0.151 and 0.178 in Models 1, 2 and 3, respectively, for the 2006 cohort.

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage; Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage; and Longitudinal Immigration Database.

Table 7 shows that CE immigrant men in the 1991 cohort with four years of study in Canada but no Canadian work experience before immigration earned less than observably equivalent FE immigrants in both the initial years after landing and the long term. CE immigrant men with four years of study in Canada and three years of experience with low earnings performed similarly to FE immigrants in the initial years after immigration but slightly better in the long term. However, CE immigrants with medium or high earnings in Canada before immigration had much higher earnings than FE immigrants in both the short term and the long term. These estimates clearly suggest that having medium or high earnings in Canada before immigration was the key factor that put CE immigrants at an advantage over FE immigrants after immigration. Years of Canadian work experience or years of Canadian education mattered much less. As will be further discussed below, the earnings level before immigration likely reflects the observed and unobserved skills of CE immigrants and the match between skills and labour market demand.

The pattern of earnings differences between CE and FE immigrant men in the 2006 cohort is generally similar to that observed in the 1991 cohort. Model 1—in the right panel of Table 5 for the 2006 cohort—shows that CE immigrants on average had higher initial earnings, by 0.072 log point, and more rapid earnings growth than FE immigrants. When sociodemographic factors are controlled for, CE immigrants had an even larger advantage in initial earnings, by 0.250 log point, but a smaller growth rate than FE immigrants. These changes were due to CE immigrants spending more months studying after immigration. Model 3 in Table 5 and the estimated earnings differences in Table 7 between FE immigrants and CE immigrants with various combinations of Canadian work history and years of Canadian study show that only CE immigrants with medium or high earnings in Canada before immigration had a large earnings advantage over FE immigrants after immigration. The effect on post-immigration earnings of having medium or high earnings before immigration was much stronger in the 2006 cohort than the 1991 cohort, while the effect of years of prior Canadian work experience was smaller. The effect of years of study in Canada was positive in the 1991 cohort but negative in the 2006 cohort.

Table 6 presents the multivariate regression for university-educated CE and FE immigrant women that corresponds to Table 5 for men. The overall patterns of earnings differences between CE and FE immigrant women were similar to those of men, with a few minor differences. The advantage of CE immigrant women in initial earnings was larger than that of men, so they did not have significantly lower earnings than FE immigrant women even without Canadian work history before immigration (see also Table 7 estimates for women). For the 2006 cohort in particular, CE immigrant women who had low earnings in Canada before immigration earned significantly more than FE immigrants (by 0.284 log point, Table 7). The effect of the earnings level before immigration on post-immigration earnings was much larger for CE immigrant women than for CE immigrant men. More years of Canadian work or study experience were not associated with an extra gain in post-immigration earnings for CE immigrant women when the earnings level before immigration was controlled for.

Table 7
Estimated earnings difference between Canadian-educated and foreign-educated immigrants, by cohort and years since immigration

	Years since immigration				
	1991 cohort			2006 cohort	
	1	5	20	1	5
	log point				
Men					
Four years of Canadian study, no Canadian work experience	-0.148	-0.132	-0.070	-0.220	-0.223
Four years of Canadian study, three years of Canadian work experience with low prior earnings	0.031	0.047	0.108	0.035	0.032
Four years of Canadian study, three years of Canadian work experience with medium prior earnings	0.208	0.225	0.286	0.354	0.351
Four years of Canadian study, three years of Canadian work experience with high prior earnings	0.610	0.626	0.688	0.787	0.784
Four years of Canadian study, one year of Canadian work experience with high prior earnings	0.564	0.581	0.642	0.764	0.761
Women					
Four years of Canadian study, no Canadian work experience	0.003	0.004	-0.012	0.040	-0.073
Four years of Canadian study, three years of Canadian work experience with low prior earnings	0.089	0.090	0.075	0.284	0.170
Four years of Canadian study, three years of Canadian work experience with medium prior earnings	0.317	0.318	0.302	0.588	0.475
Four years of Canadian study, three years of Canadian work experience with high prior earnings	0.744	0.746	0.730	1.032	0.919
Four years of Canadian study, one year of Canadian work experience with high prior earnings	0.754	0.755	0.739	1.033	0.920

Note: Estimated from Model 3 in Tables 5 and 6.

Sources: Statistics Canada, 1991 Census and Longitudinal Worker File linkage; 2006 Census and T1 personal tax file linkage, Temporary Residents File, Immigrant Landing File and T1 personal tax file linkage, and Longitudinal Immigration Database.

4 Discussion and conclusion

This study compared the earnings trajectories of immigrants who are former international students in Canada (Canadian-educated [CE] immigrants), foreign-educated (FE) immigrants and the Canadian-born population. This is the first comprehensive study in Canada and, to the best of the authors' knowledge, in any major immigrant-receiving Western country that uses large national longitudinal datasets to examine cross-cohort trends and within-cohort changes in the earnings of former international students who became permanent residents relative to FE immigrants and native-born workers. The analysis followed the earnings trajectories of university graduates who were aged 25 to 34 in the 1991 and 2006 cohorts.

The results showed that CE immigrants who graduated from university had a large earnings gap with their Canadian-born counterparts both in the initial years after immigration and in the long term. In the first full year after becoming permanent residents, CE immigrant workers earned on average about 50% less (for women) to 60% less (for men) than Canadian-born workers in the 1991 cohort. This gap narrowed in the first 10 years after immigration to 20% among women and 31% among men, but there was no further catching up afterwards. The narrowing of the initial earnings gap was also observed during the six-year follow-up period for the 2006 cohort. Part of the earnings gap was related to the fact that most CE immigrants belonged to a visible minority, and they tended to spend more time pursuing additional education. However, most of the gap could be accounted for by differences in Canadian work history. For both the 1991 cohort and the 2006 cohort, about 50% of CE immigrant men had medium or high earnings in Canada before the base year (the year of immigration), compared with about 90% of Canadian-born men. When group differences in prior Canadian work history were taken into account, the earnings gap of CE immigrants became much smaller in the 1991 cohort and disappeared in the 2006 cohort.

The disadvantage of CE immigrants in prior Canadian work history is certainly endogenous and could originate from a variety of sources: pursuing education beyond the bachelor's level at a higher rate, resulting in fewer years in the labour force; starting Canadian university education at a later age or taking longer to finish a given level of education; and having more difficulties in finding a good job after graduation because of deficiencies in their social network and language abilities. An investigation of these possible factors requires information that is not available in the administrative data used for this study. Nevertheless, these results suggest that many CE immigrants could not overcome this disadvantage in the initial stage of their career even 20 years after immigration.

On average, CE immigrants did have some advantages in post-immigration earnings over FE immigrants. Their earnings advantage in the first full year after immigration was moderate among men (0.19 log point, or 21%, in the 1991 cohort and 0.17 log point, or 18%, in the 2006 cohort) and somewhat larger among women. The earnings advantage of CE immigrants increased slightly over time among men, mostly because they were more likely to pursue additional education in the initial years after immigration and this tended to reduce their relative earnings in those years. The observed earnings advantage of CE immigrants barely changed when group differences in individual-level sociodemographic characteristics and source-country attributes were taken into account. However, the earnings advantages of CE immigrants were concentrated among those who had medium or high earnings in Canada before immigration. CE immigrant men without a Canadian work history before immigration, who made up 9% of all CE immigrants in the 1991 cohort and 12% in the 2006 cohort, earned significantly less than FE immigrants. CE immigrant men who had worked but had had low earnings in Canada before immigration, who made up about 40% of all CE immigrant men, did not have a significant earnings advantage over FE immigrants. Only CE immigrants who had had medium or high earnings before immigration had much higher earnings than FE immigrants, and this advantage was larger in the 2006 cohort than in the 1991 cohort. The post-immigration earnings of CE immigrant women without prior Canadian work experience were similar to those of FE immigrant women. However, as long as

CE immigrant women had prior Canadian work experience, they surpassed FE immigrant women in post-immigration earnings by a wide margin, particularly in the 2006 cohort.

These results may suggest that the level of pre-landing Canadian earnings plays an increasing role in differentiating the post-immigration labour market outcomes of university-educated immigrants. Over the 1990s and 2000s, the share of immigrants with a university degree more than doubled among men and tripled among women; it reached over 50% among prime-aged immigrants (Hou and Picot 2016). Meanwhile, the earnings returns to university education declined among immigrants both in absolute terms and relative to lower levels of education (Picot, Hou and Qiu 2016). While education might have become less indicative of the earning potential of immigrants, the level of pre-landing Canadian earnings, as a proven record of success in the Canadian labour market, might come to be more effective in capturing the unobserved skills of immigrants and the match between their skills and labour market demand.

Reasons why some international students could find good jobs and have high earnings before immigration while others could not are likely complicated and cannot be addressed by the data used in this study. Labour market demand and supply in particular fields of study, language ability, concentration in certain types of educational institutions and contact with the receiving society are among the possible factors (Hawthorne and To 2014). It is also possible that certain international students may face a labour market barrier that constrains their chance of finding a high-paying job after finishing their Canadian education. Further understanding of these underlying factors would help more international students become economically successful immigrants.

Finally, this study found that an extra year of Canadian work experience or an extra year of Canadian education experience added only a small or no earnings gain after immigration for CE immigrants when earnings level in Canada before immigration was controlled for. This seems to suggest that general acculturation associated with extended exposure to the receiving society was not a strong predictor of post-immigration earnings when achieved educational attainment and earnings level before immigration are taken into consideration. What matters to CE immigrants was not years of Canadian work or study experience, but the realized market value of the Canadian work or education experience, as indicated by the earnings level in Canada before immigration.

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